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File: USPT

Jun 14, 1988

DOCUMENT-IDENTIFIER: US 4751502 A

TITLE: Display controller for displaying a cursor on either of a CRT display device or a liquid crystal display device

Abstract Text (1):

A display controller which can display a cursor on either of a CRT display or a liquid crystal type display device is described. The liquid crystal type display device is a type that has an upper and lower display blocks which are scanned substantially in parallel. This display controller allows the display position of the cursor to be designated in the same manner, independent of the type of display device used. The display controller operates in a time sharing manner, alternately on the upper and lower display blocks of the liquid crystal device. Two groups of data corresponding to these upper and lower blocks are formed and are supplied to the liquid crystal display device substantially in parallel. X and Y coordinate positions of the cursor position are also stored. The cursor pattern signal for the liquid crystal display device is also stored in a time shared manner.

Brief Summary Text (13):

According to an aspect of the present invention, there is provided a display controller for use with a display device having a plurality of scanning-type display screens arranged in the direction perpendicular to the directions of scanning thereof to form a single screen for providing a plurality of display dots thereon, the display controller effecting scanings of the plurality of screens of the display device in parallel, the display controller comprising clock signal generating means for generating a clock signal synchronized with the scanings of the plurality of display screens; display screen designating means for designating, in a time-sharing manner, one of the plurality of display screens in accordance with the clock signal to output a data forming timing signal indicative of one of the display screens; display data forming means responsive to the data forming timing signal and the clock signal for forming, in a time-sharing manner, display data each representing a dot image of a respective one of the plurality of display dots on the screen; data separating means for separating the display data formed by the display data forming means into a plurality of groups of data each corresponding to a respective one of the plurality of screens, the data separating means feeding the plurality of groups of data to the display device in parallel; pattern memory means for storing bit-pattern data representative of a cursor in the form of a dot-matrix; first and second register means for storing first position data representative of a horizontal position of a dot on the single display screen at which the cursor is to be displayed and second position data representative of a vertical position of the dot of the cursor on the single display screen, respectively; and cursor pattern signal forming means responsive to the clock signal, the data forming timing signal and the first and second position data for forming from the bit-pattern data a cursor pattern signal in a time-sharing manner; the display data forming means forming the display data in accordance with the cursor pattern signal to thereby display the cursor on the single screen at a position determined by the horizontal and vertical positions.

Brief Summary Text (14):

According to another aspect of the present invention, there is provided a display controller for use with either of a first display device having a single scanning-type display screen for providing a plurality of display dots thereon and a second display device having a plurality of scanning-type display screens arranged in the direction perpendicular to the directions of scanning thereof to form a single screen for providing a plurality of display dots thereon, the display

controller effecting scanning of the plurality of screens of the second display device in parallel, the display controller comprising display device designating means for designating one of the first and the second display devices, the display device designating means outputting a first designation signal when the first display device is designated and outputting a second designation signal when the second display device is designated; clock signal generating means for generating a first clock signal synchronized with the scanning of the display screen of the first display device in response to the first designation signal and for generating a second clock signal synchronized with the scanings of the plurality of display screens of the second display device in response to the second designation signal; display screen selecting means responsive to the second designation signal for selecting, in a time-sharing manner, each of the plurality of display screens in accordance with the second clock signal to output a data forming timing signal indicative of the each selected display screen; display data forming means responsive to the first designation signal for forming display data each representing a dot image of a respective one of the plurality of display dots provided on the screen of the first display device in accordance with the first clock signal, the display data forming means being responsive to the second designation signal to form, in a time-sharing manner, display data each representing a dot image of a respective one of the plurality of display dots provided on the screen of the second display device in accordance with the second clock signal and the data forming timing signal; data feeding means responsive to the first designation signal for feeding the display data to the first display device; data separating means responsive to the second designation signal for separating the display data formed by the display data forming means into a plurality of groups of data each corresponding to a respective one of the plurality of screens of the second display device and for feeding the plurality of groups of data to the second display device in parallel; pattern memory means for storing bit-pattern data representative of a cursor in the form of a dot-matrix; first and second register means for storing first position data representative of a horizontal display position of a dot of the cursor and second position data representative of a vertical display position of the dot of the cursor; and cursor pattern signal forming means responsive to the first designation signal, the first clock signal and the first and second position data for forming from the bit-pattern data a first cursor pattern signal in such a timing that the cursor is displayed on the screen of the first display device at a position determined by the first and second display positions, the cursor pattern signal forming means being responsive to the second designation signal, the second clock signal, the data forming timing signal and the first and second position data to form from the bit-pattern data a second cursor pattern signal in a time-sharing manner; the display data forming means forming the display data in accordance with the first cursor pattern signal in response to the first designation signal to thereby display the cursor on the screen of the first display device at the position determined by the horizontal and vertical display positions, the display data forming means forming the display data in accordance with the second cursor pattern signal in response to the second designation signal to thereby display the cursor on the screen of the second display device at the position determined by the horizontal and vertical display positions.

Detailed Description Text (3):

Referring now to FIGS. 1 and 2, a display controller 10 provided in accordance with one embodiment of the present invention displays various kinds of dot patterns on a screen of a CRT display device 11a or a liquid crystal display device 11b shown in FIG. 2, by effecting a data exchange with a CPU 12 (FIG. 1) which is a device that is external to the controller 10. The screen of the liquid crystal display device 11b is constituted by an upper display block A and a lower display block B. A memory 13 (FIG. 1) stores data and various programs to be executed by the CPU 12.

Detailed Description Text (8):

Referring first to FIG. 3 showing the screen of the CRT display device 11a, the origin (0, 0) of the coordinates is set at the left upper corner of the display screen. The X-coordinate is represented by an offset in the right hand direction from the origin (0, 0), while the Y-coordinate is represented by the downward offset from the origin. Referring now to FIG. 4 illustrating the screen of the liquid crystal display device 11b, the display screen is divided into two blocks, namely, the upper display block A and the lower display block B. Each of the blocks A and B

is constituted by a 640.times.100 dot-matrix as illustrated. When the cursor 24 is located at a position PS1, the X- and Y-coordinates are given as (2, 1), whereas, when the cursor 24 is located at a position PS2, the X- and Y-coordinates thereof are given as (2, 101). Thus, when the liquid crystal display 11b is used, the X- and Y-coordinates of the cursor 24 are designated such that the two display blocks A and B constitute, in combination, a single screen. Thus, the designation of the coordinate positions of the cursor 24 on the screen of the liquid crystal display device 11b can be made in the same way as that used for the CRT display device 11a. It will be seen that the position of the cursor 24 is represented by the position of the upper-left corner dot thereof.

Detailed Description Text (61):

When the Y-coordinate written in the register 25 exceeds "100" in decimal, the result of the calculation effected by the adder 26 is within the range of between "0" and "15" only when the data AV exceeds "100" and when the signal UD is in the state "1" state, so that the cursor 24 is displayed in the designated position on the display block B. Thus, the designation of the Y-coordinate of the cursor 24 can be made in the same manner as that for the CRT display device 11a, wherein the display screen is constituted by the upper display block A and the lower display block B, and the uppermost and lowermost horizontal lines of the display screen are 0th and 199th horizontal scanning lines, respectively.

CLAIMS:

1. A display controller for use with either one of a first display device of a type having a single scanning-type display screen to provide a plurality of display dots thereon or a second display device of a type having a plurality of scanning-type display screens arranged in a direction perpendicular to a direction of scanning thereof to form a single screen for providing a plurality of display dots thereon, the display controller alternately effecting scanning among portions of the plurality of screens of the second display device substantially in parallel, said display controller comprising:

display device designating means for designating a type of display device to be used, said type of display device being one of the first display device type or the second display device type, said display device designating means outputting a first designation signal to designate the first display device type and outputting a second designation signal to designate the second display device type;

clock signal generating means for generating a first clock signal synchronized with a scanning of the display screen of the first display device in response to said first designation signal, and for generating a second clock signal synchronized with a scanning of the plurality of display screens of the second display device in response to said second designation signal;

display screen selecting means, responsive to said second designation signal, for alternately selecting, in a time-sharing manner such that portions of each of said plurality of display screens are alternately selected, among the plurality of display screens in accordance with said second clock signal and outputting a data forming timing signal indicative of said each selected display screen;

display data forming means, responsive to said first designation signal, for forming a plurality of display data, each representing a dot image of a respective one of the plurality of display dots provided on the display screen of the first display device in accordance with said first clock signal, said display data forming means also being responsive to said second designation signal to alternately form display data representing a dot image of a respective one of the plurality of display dots provided on the display screen of said second display device in a time-sharing manner such that portions of different display data are alternately formed, and in accordance with said second clock signal and said data forming timing signal;

data feeding means, responsive to said first designation signal and coupled to said display data forming means, for feeding said display data to said first display device;

data separating means, responsive to said second designation signal and coupled to said display data forming means, for separating said display data formed by said display data forming means into a plurality of groups of data, each group corresponding to a respective one of said plurality of screens of said second display device, and for feeding said plurality of groups of data to said second display device substantially in parallel;

pattern memory means for storing a bit-pattern data, representative of a cursor, in the form of a dot-matrix;

first and second register means for storing first position data representative of a horizontal display position of a dot of said cursor, and storing second position data representative of a vertical display position of said dot of said cursor; and

cursor pattern signal forming means, responsive to said first designation signal, said first clock signal and said first and second position data, for forming a first cursor pattern signal from said bit-pattern data, having a timing such that said cursor is displayed on the display screen of said first display device at a position determined by said first and second display positions, said cursor pattern signal forming means also being responsive to said second designation signal, said second clock signal, said data forming timing signal and said first and second position data to form a second cursor pattern signal from said bit-pattern data;

said display data forming means including means for forming said display data in accordance with said first cursor pattern signal in response to said first designation signal, to thereby display said cursor on said display screen of said first display device at said position determined by said horizontal and vertical display positions, and means for forming said display data in accordance with said second cursor pattern signal in response to said second designation signal to thereby display said cursor on said display screen of said second display device at said position determined by said horizontal and vertical display positions.